

REMARKS

Claims 1-23 are pending in this application. Applicants amend claim 10, herein.

The Examiner has rejected claims 1-23. Applicants request that the Examiner reconsider claims 1-23 based on the amendment and the following remarks and arguments.

I. Claim Rejections – 35 USC § 102

A. Claims 7, 10, 13 – Skeem et al.

The Examiner has rejected claims 7, 10, 13 under 35 U.S.C. 102(b) as being anticipated by Skeem et al. The Examiner suggests that Skeem et al. discloses all of the subject matter set forth in the claims as presented. The Examiner directs Applicants' attention to columns 9 and 10 of the disclosure.

Applicants respectfully disagree that Skeem et al. anticipates Applicants' claims 7, 10, and 13. Skeem et al. discloses an "invention that can be used in typical SL (single layer) configurations, including wheels, core bits and flat blades" (col. 9; lns. 31-32). Skeem et al. defines an SL configuration on a cutting tool as having "a single layer of abrasive grain (or "grit") bonded to a smooth metal substrate by a minimum of bond material so that the abrasive grit is essentially exposed on the cutting surface of the tool" (col. 1; lns. 14-18).

The single layer (SL) configuration of Skeem et al. is repeated and emphasized in Skeem et al. For example, Skeem et al. discloses: "the SL tool of the present invention" (col. 9; ln. 15); "an abrasive cutting wheel comprising...a single layer of abrasive grains 76 chemically bonded to the perimeter of each tooth" (col. 9; lns. 34-41; FIG. 10); "an abrasive core drill comprising...a single layer of abrasive grains 85 chemically bonded to the teeth" (col. 9; lns. 54-60; FIG. 11); and "an abrasive blade comprising...a single layer of abrasive grains 95 bonded to each tooth" (col. 10; lns. 19-26).

Nowhere in Skeem et al. is it taught "A cutting tool **insert**...comprising a superabrasive blank having an average grain size less than or equal to about 10 μm " as claimed by Applicants in their pending claim 7 (emphasis added). Applicants define an insert as "compris(ing) superabrasive materials of PCD, PCBN, or mixtures thereof, commercially available...as 'superabrasive tool blanks'" (para. [023]). In fact, claim 7 itself specifically recites the limitation of a blank. Furthermore, the "superabrasive tool blanks are generally thermally stable compacts of PCD or PCBN bonded to supports of cemented metal carbide or similar material known as a substrate" (para. [025]). Claim 10 specifically recites the requirement of a substrate, which is not found in Skeem et al. Still furthermore, "A compact may be characterized generally as an integrally bonded structure formed of a sintered, polycrystalline mass of abrasive particles, such as diamond or cubic boron nitride" (para. [026]). Applicants have amended claim 10 to expressly clarify this.

It is clear from FIGs. 10-12 of Skeem et al. that the disclosure of Skeem et al. relates to a single layer of crystals on the substrate surface. For example, Skeem et al. discloses a "**single layer of abrasive grain**...bonded to a smooth metal substrate by a **minimum** of bond material so that the abrasive grain is essentially exposed on the cutting surface of the tool (col. 1; lns. 15-18) (emphasis added). This "single layer" does not anticipate "a cutting tool **insert**...comprising a superabrasive blank having an average grain size less than or equal to about 10 μm " (emphasis added) as claimed by Applicants in claim 7, and as "insert" is defined by Applicants in their Specification and summarized *supra*.

Applicants' embodiments are even further distinguished from Skeem et al. in that the particle size of the single layer of abrasive particles disclosed of Skeem et al. does not

encompass the superabrasive particle size range that is claimed in Applicants' claim 7, which states "A cutting tool insert...comprising a superabrasive blank having an **average grain size less than or equal to about 10 μm** " (emphasis added).

Skeem et al. make the disclosure that "the abrasive has a grain size of less than 1000 μm , preferably between 100 μm and 600 μm " (col. 8; lns. 42-44). Applicants assert that the broad comment of Skeem et al. that "the abrasive has a grain size of less than 1000 μm (col. 8; lns. 42-43) does not disclose in a manner that enables one skilled in that art to appreciate that it teaches $\leq 10 \mu\text{m}$. This is illustrated by reviewing the examples in Skeem et al. For example, Skeem et al. specifically teaches: "the abrasive is typically diamond in the size range of 500 μm , preferably between about 450 μm and 650 μm " (col. 9; lns. 48-49); "the abrasive is typically diamond in the size range of 500 μm , preferably between about 430 and 540 μm " (col. 9; lns. 66-67 through col. 10; ln. 1); "the abrasive is typically diamond in the size range of 300 to 600 μm , preferably between about 300 μm and 500 μm (col. 10; lns. 33-34); "when diamond is used, it typically has a grain size of between about 100 and 500 μm " (col. 8; lns. 48-49), and "when cubic boron nitride is used, it typically has grain size of between about 100 and 500 μm ." (col. 8; lns. 50-52). The open ended disclosure in Skeem et al. of "less than 1000 μm " is not supported by the specification of Skeem et al. to encompass Applicants' grain sizes of $\leq 10 \mu\text{m}$. The specification of Skeem et al. does not disclose grain sizes less than 100 μm . There is no known lower limit inherent in Skeem et al. that would enable one of skill in the art to approach a lower limit that would encompass Applicants' grain sizes of $\leq 10 \mu\text{m}$. (*Scripps Clinic & Research Foundation v. Genetic, Inc.*, 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991); "Open ended

claims...may be supported if there is an inherent, albeit not precisely known, upper limit and the **specification** enables one of skill in the art to approach that limit" (emphasis added)).

Nowhere in the specific disclosures of Skeem et al. does it suggest "A cutting tool insert...comprising a superabrasive blank **having an average grain size less than or equal to about 10 μm** " as claimed by Applicants in their pending claim 7. (emphasis added) Since Skeem et al. does not provide an example that has a "A cutting tool ...comprising a superabrasive blank having an **average grain size less than or equal to about 10 μm ,**" Applicants' claim 7 is not anticipated by Skeem et al. in terms of the abrasive particle size. Applicants' claim 7 abrasive particle size of "less than or equal to about 10 μm " is one to two orders of magnitude less than the preferred sizes for diamond particles of Skeem et al. ("between 100 and 1000 μm " – col. 8; lns. 48-49), and at least one order of magnitude less than the preferred sizes for cubic boron nitride particles of Skeem et al. ("between 100 and 500 μm " – col. 8; lns. 50-53)

Based on the arguments *supra*, Applicants' claim 7 is not anticipated under 35 U.S.C. § 102(b) by Skeem et al., nor would Applicants' claim 7 be made obvious by Skeem et al. Therefore, Applicants' claim 7 is in condition for allowance. Since Applicants' independent claim 7 is in condition for allowance, claims 10 and 13, which directly depend from claim 7, are also in condition for allowance. Applicants respectfully request that the Examiner allow Applicants' claims 7-13.

B. Claims 14, 20, 21 – Skeem et al.

The Examiner has rejected claims 14, 20, and 21 under 35 U.S.C. § 102(b) under Skeem et al. Applicants assert that all of the arguments made above to differentiate Applicants'

claim 7 from Skeem et al. equally apply to Applicants' independent claim 14. Therefore, Applicants request that their pending independent claim 14 is in condition for allowance, in that Skeem et al. does not teach "A machining tool for cutting fiber cement parts comprising a cutting tool insert, wherein the insert comprises a **superabrasive blank having an average grain size less than or equal to about 10 μm .**" (emphasis added) Since independent claim 14 is in condition for allowance, all claims that directly or indirectly depend from claim 14, that is, claims 15-21, are also in condition for allowance. Applicants respectfully request that Examiner allows pending claims 14-21.

II. Claim Rejections – 35 USC § 103

A. Claims 8, 9, 11, 12, 15-19 – Skeem et al.

The Examiner has rejected claims 8, 9, 11, 12, 15-19 under 35 U.S.C. 103(a) as being unpatentable over Skeem et al. Applicants have provided effective arguments above that independent claims 7 and 14 are not anticipated, nor made obvious, by Skeem et al. As argued *supra*, Skeem et al. teaches "single layers" of abrasive particles, not an "insert...compris(ing) a superabrasive blank" as in claimed in Applicants' claims 7 and 14. Further, Skeem et al. teaches particles having sizes one to two orders of magnitude greater than that claimed by Applicants' claim 7 and 14. Skeem et al. teaches particle sizes from 100 to about 1000 μm , whereas Applicants claim "average grain size less than or equal to about 10 μm " (pending independent claims 7 and 14).

Since independent claims 7 and 14 are not made unpatentable under 35 U.S.C. § 103(a) over Skeem et al., those claims that depend directly or indirectly from claims 7 and 14 are also not made unpatentable under 35 U.S.C. § 103(a) over Skeem et al. Therefore, Applicants

request that claims 8, 9, 11, and 12, which depend from allowable claim 7, and claims 15-19, which depend from allowable claim 14, are also in condition for allowance.

B. Claims 1-6, 22, 23 – Fladgard / Skeem et al.

The Examiner has rejected Applicants' claims 1-6, 22, and 23 under 35 U.S.C. 103(a) as being unpatentable over Fladgard et al. in view of Skeem et al. Examiner states that "it would have been obvious to a skilled artisan at the time the invention was made to provide the cutting insert of Fladgard et al. (34) with a superabrasive coating as taught by Skeem et al. in order to improve the cutting efficiency of the tool." Applicants respectfully disagree.

Skeem et al. discloses a grinding tool and Fladgard et al. discloses a sawing blade. Applicants claim a cutting insert. It is respectfully asserted that one of ordinary skill in the art would not make the comparison between these items because the kinematics of the material removal process and the material removal rates are completely different. In a grinding wheel (or saw blade) the cutting action is provided by randomly oriented abrasive particles, which go in and out of the cut in one revolution. On the other hand, in a cutting tool insert the cutting action is concentrated on a well defined cutting edge formed by the aggregate of the superabrasive particles and binder.

Applicants are claiming a cutting tool **insert** with a defined cutting edge (as commonly referred to in the art) such as those used for turning, milling and drilling operations. On the other hand, the cutting tools referred to by Skeem et al. has multiple undefined cutting edges and are commonly referred to in art as grinding wheels, core drills etc. and cannot be compared directly.

Fladgard et al. discloses mere blades (34 and 44; col. 4; lns. 34-39) and does not mention a single layer coating as disclosed in Skeem et al., nor a "cutting tool insert" as claimed by Applicants in independent claims 1 and 22. Further, the single layer coating disclosed by Skeem et al. is not analogous to "a cutting tool **insert** comprising a superabrasive material having an average grain size less than or equal to about 10 μm " as claimed in Applicants' claims 1 and 22. This is true for all of the reasons and arguments made *supra* for independent claims 7 and 14. In summary, Skeem et al. teaches a single layer coating, whereas Applicants' specification describes "**inserts or superabrasive tool blanks** are generally thermally stable **compacts**." (para. [025]) (emphasis added) Further, Applicants state that a "**compact** may be characterized generally as an integrally bonded structure formed of a sintered, polycrystalline mass of abrasive particles." (para. [026]) Applicants' compact clearly is not anticipated, nor made obvious by the single layer coating of Skeem et al. In addition, Skeem et al. discloses particle sizes between 100 and 1000 μm (col. 8; lns. 48-49), whereas Applicants' claims 1 and 22 claim "an average grain size of less than or equal to about 10 μm ."

Particle sizes that are required to make a good part will vary with the type of tool being used. Since the material removal achieved with a cutting tool versus one with a grinding wheel is somewhat different kinematically, a direct comparison of the particle sizes that may produce a good part is appropriate. For example, Applicants have found that machining of cast irons may use a PCBN insert as claimed by Applicants, having particle size less than about 10 μm . However, when the same material is ground with a grinding wheel, as taught by Skeem et al., such particle sizes are not appropriate. Rather, particle sizes in the 150 μm to 250 μm range

are more appropriate. Even then the material removal rates achieved by the two processes are not comparable.

Fladgard et al. describes a method for cutting fiber-cement siding (FCS) that uses two cutting blades (34 and 44). Skeem et al. describes single layer abrasive coatings with particle sizes on the order of 100-1000 μm . Applicants claim "a cutting tool insert comprising a superabrasive material having an average grain size of less than or equal to about 10 μm ." (independent claims 1, 7, 14, and 22) Applicants' superabrasive grain size differs by up to two orders of magnitude. Applicants claim cutting tool inserts that are generally stable compacts (para. [025]) generally characterized as an integrally bonded sintered structure of a polycrystalline mass of superabrasive particle (para. [026]), a not a single layer coating. Because of the differences pointed out herein, Applicants' embodiments are not obvious over Fladgard et al. in view of Skeem et al.

For the reasons stated *supra*, independent claims 1 and 22 are in condition for allowance. Since independent claims 1 and 22 are in condition for allowance, those claims that depend from claims 1 and 22, that is, claims 2-6 and claim 23, respectively, are also in condition for allowance. Applicants respectfully request that Examiner allow claims 1-6 and 22-23.

CONCLUSION

Claims 1-23 are now pending. Claim 10 has been amended herein.

The claims listed in the Amendments to the Claims, herein, are submitted for the Examiner's reconsideration for allowance based on the claim amendment and on Applicants' arguments presented in the REMARKS section *supra*.

All of the stated grounds of rejection have been properly traversed, accommodated or rendered moot. Applicants, therefore, respectfully request that the Examiner reconsider and withdraw all presently outstanding rejections. There being no other rejections, Applicants respectfully request that the current application be allowed and passed to issue.

Should the Examiner have any questions or comments, or need any additional information, he is invited to contact the undersigned at her convenience.

No fee is believed to be due for this submission. To the extent that fees may be required for this Amendment, the Commissioner is hereby authorized to debit Deposit Account 50-0436.

Respectfully submitted,
PEPPER HAMILTON LLP

A handwritten signature in dark ink, appearing to read 'James M. Singer', with a long horizontal flourish extending to the right.

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Date: September 29, 2006